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# EVADE COMMUNICABLE DISEASES THROUGH HANDWASHING

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## ABSTRACT

Hand hygiene can be thought of as a “do – it- yourself” vaccine that is easy, effective and affordable, but the world still bears the burden of diseases that can be effectively prevented through good hand hygiene. The concept of handwashing is important in various medical, domestic and school settings. Awareness and motivation for handwashing can evolve into a revolution in making this world a healthier place to live in. Though there have been numerous studies on the effectiveness of hand hygiene on prevention and control of infectious diseases, yet efforts at community and state level have failed to produce effective results. It is high time that the policy makers started analyzing into what drives hygiene behavior and how the idea of promoting handwashing in social marketing contexts along with a collaborative effort on local and international levels can help in the prevention of diseases. This shall save millions of precious lives, financial resources and also improve the quality of life.

**KEYWORDS:** Handwashing, Infectious Diseases, Prevention

## INTRODUCTION

Handwashing is one of the most effective and most overlooked ways to stop diseases. In fact, good hand hygiene has been one of the most cost-effective ways to promote good health. No doubt, hand hygiene has been one of the major issues in infection prevention and promotion of good health in the world. In fact, Center for Disease Control and Prevention (CDC, USA) has identified handwashing as the single most important means of preventing the spread of infection. Promoted on a wide enough scale, handwashing with soap can be thought of as a “do-it-yourself" vaccine because it is easy, effective, and affordable. Studies show that handwashing at critical times including before eating or preparing food and after using the toilet can reduce diarrhea rates by almost 47% (Curtis and Cairncross, 2003). Community handwashing interventions can also lead to respiratory infection reductions of 16% (Rabie and Curtis, 2006).

## JUST NOT ENOUGH HANDWASHING

However, though there is enough evidence of the importance of good handwashing for the prevention of disease, still people don't wash their hands or don't do it well enough to make a difference. According to American Society of Microbiology, 97% of females and 92% of males say they wash but actually only 75% of females and 58% of males wash. Moreover, 50% of middle and high school students wash, and of these, only 33% of females and 8% of males use soap.

Studies about handwashing as an effective intervention for preventing diarrhea have concluded that handwashing is effective, but the challenge is to find effective ways of getting people to wash their hands appropriately. (Ejemot et. al. 2008)

Promoting handwashing as a habit at a global level might seem simple but is in fact a herculean task. With many developing and overpopulated countries struggling with their means and resources, basic handwashing for prevention of communicative diseases has become a challenge. Worldwide, 780 million individuals lack access to improved drinking water and 2.5 billion lack improved sanitation. No doubt, deaths due to infectious diseases are widespread throughout developing countries. The vast majority of deaths due to diarrheal and respiratory diseases occur among children in low and middle income countries where access to health care services is suboptimal (Black et.al.2003). Therefore, extensive international coordination along with local efforts is required in encouraging handwashing as a habit.

## HOW HANDWASHING STOPS DISEASE TRANSMISSION

Communicable diseases, also called infectious and contagious diseases, spread from one person to another or from animal to a person. The spread often happens via airborne viruses or bacteria, but also through blood or other bodily fluids. For infecting organisms to survive and repeat the infection cycle in other hosts, they (or their progeny) must leave an existing reservoir and cause infection elsewhere. Infection transmission can take place via many potential routes. One of them is fecal-oral transmission. Studies have established that diarrheal disease pathogens are usually transmitted through the fecal-oral route (Curtis, 2000).

A single gram of human feces can contain ten million viruses and one million bacteria. Common fecal-oral transmitted pathogens include *Vibrio cholerae*, *Giardia species*, *rotaviruses*, *Entamoeba histolytica*, *Escherichia coli* and tape worms (Bernstein, 2010). Fecal-oral transmission occurs when food or water become contaminated due to lack of handwashing before preparing/eating food or untreated sewage being released into drinking water supply. According to US Department of Health Services, the modes of transmission are ingestion of food and water contaminated by fecal matter, person to person contact or direct contact with infected feces (Black, 1989). Thus, pathogens from human feces are the sources of common endemic gastro-enteric infections and some respiratory infections such as influenza and pneumonia.

If the excreta lying in the open is disposed and hands are cleaned after defecting or cleaning a child, then the cycle of transmission of various bacteria, viruses and protozoa can be inhibited. Handwashing with soap interrupts the transmission of these pathogens. Hands often transmit these disease causing pathogens from person to person through direct contact or indirectly via surfaces and foods.

Diarrheal diseases are often termed as water-borne diseases but in fact, pathogens from the excreta are to be held responsible for these diseases. Various studies have approximated that contaminated food and water causes majority of diarrheal cases. Studies show that the simple act of washing hands with soap can significantly cut the risk of diarrhea from 30% to 50% (Fewtrell et al, 2005) and of respiratory tract infections from 21% to 45% (Curtis and Cairncross, 2003). In comparison to other interventions, the effectiveness of handwashing with soap reduces diarrheal illness substantially. The study also estimated that such interventions could prevent one million child deaths per year. According to a detailed review study of handwashing for preventing diarrhea, it was concluded that interventions which promote handwashing are efficacious in reducing diarrheal episodes by about one – third and should be encouraged (Ejemot et al, 2008).

Handwashing is instrumental in reducing the rate of respiratory infections too. Handwashing removes respiratory pathogens found on hands and surface and also other pathogens like enteric viruses. Thus, it acts like a double shield reducing diseases causing diarrhea and respiratory symptoms. Various studies have reiterated the importance of

handwashing as an effective intervention in preventing respiratory infections (Luby et al, 2005; Rabie and Curtis, 2006).

In a study to evaluate the effectiveness of an intensive hand hygiene campaign on reducing absenteeism caused by influenza like illness (ILI), diarrhea, conjunctivitis and laboratory confirmed influenza, it was found that compared with results for the control group, in the intervention group, overall absences caused by ILI, diarrhea, conjunctivitis, and laboratory confirmed influenza were reduced by 40%, 30%, 67% and 50% respectively (Talaat et al, 2011).

Thus handwashing is significant in promoting health by stopping the transmission of pathogens which cause ill health due to diarrheal diseases, acute respiratory infections including influenza $H_1N_1$ and the SARS causing corona virus, eye and skin infections, and various intestinal worm infections especially ascariasis and trichuriasis. Handwashing has also been recommended for prevention of diseases with pandemic potential, such as influenza and several acute respiratory syndromes (Bell, 2006).

## THE BURDEN OF INFECTIOUS DISEASES

The burden of infectious diseases is high in terms of lives lost, deterioration of quality of life and working life along with financial implications and issues like absenteeism from work or in case of children, absenteeism from school and lowered academic proficiency and malnutrition. According to data from Institute for Health Metrics and Evaluation, about 10 million people around the world died of communicable diseases in 2010. UNICEF estimates that approximately one child death due to diarrhea occurs every 30 seconds. The World Health Organization (WHO factsheet 330) estimates that diarrheal infections claim the lives of 7,60,000 children every year. According to them, diarrhea is the leading cause of death among children under five. The yearly global diarrheal disease burden is estimated at 99.2 million disability adjusted life years (DALYs) lost through incapacitation and premature deaths mainly in low and middle income countries (Murray,1996). The term DALYs is used to measure the burdens of disease and effectiveness of death interventions by combining information on "years of life lost" and the "years lived with disability". Each year, diarrheal and respiratory diseases kill more than 5.5 million people and lead to more than 140 million disability adjusted life-years lost (Lopez et al, 2006). WHO in its report changing history (2004) has given a worldwide mortality rate due to infectious diseases.

**Table 1: Worldwide Mortality Due to Various Infectious Diseases with their Ranks**

| Rank | Cause of Death | Deaths 2002 (in Millions) | Percentage of All Deaths |
|---|---|---|---|
| 1. | Lower respiratory infections | 3.9 | 6.9% |
| 2. | HIV/AIDS | 2.8 | 4.9% |
| 3. | Diarrheal diseases | 1.8 | 3.2% |
| 4. | Tuberculosis (TB) | 1.6 | 2.7% |
| 6. | Measles | 0.6 | 1.1% |
| 7. | Pertussis | 0.29 | 0.5% |
| 9. | Meningitis | 0.17 | 0.3% |
| 10. | Syphilis | 0.16 | 0.3% |
| 12-17. | Tropical diseases | 0.13 | 0.2% |

Source: World Health Report (2004)

Studies on effect of handwashing on health and illness state that with appropriate handwashing interventions, it is possible that as many as one million of these lives could be saved (Curtis and Cairncross, 2003). Not only this, various hygiene interventions have been associated with fewer visits to health care providers (Luby et al, 2004) and decreased use of antimicrobial medications (Uhari and Mottonen, 1999). This definitely removes the financial burden of disease on

people and the state. In places where health care resources are limited, these effects are especially important (Bowen et al, 2007). The economic benefits of promoting handwashing in children may arise from fewer health care encounters, less parental work income lost while caring for ill children and decreased need for teachers to assist ill children with lessons they missed (Uhari, 1999).

Infections diseases also lead to malnutrition among children. The synergistic relationship between malnutrition and infection is clearly exacerbated in diarrheal episodes as children tend to eat less during episodes and their ability to absorb nutrients is reduced (WHO, 2003). The impact of infectious diseases has various financial implications also. According to Center for Disease Control and Prevention (CDC, USA), each year an alarming 2,400,000+ nosocomial infections occur in the US alone. They are estimated to cause directly 30,000 deaths and contribute to another 70,000 deaths each year. Nosocomial infections cost over $ 2,300 per incident and $ 4,5 billion annually in extended care and treatment.

## HAND HYGIENE IN VARIOUS PERSPECTIVES

### Hand Hygiene in Medical Settings

In healthcare settings, handwashing is often cited as the primary weapon in infection control arsenal. Handwashing in medical settings pertains to cleansing of hands of pathogens (including bacteria or virus) and chemicals in patient care to avoid hospital acquired infections. The Association for Professionals in Infection Control and Epidemiology Inc. (APIC) and several other agencies have published guidelines, for handwashing and antisepsis in health care settings. The hands of the health care worker become the medium of transmission of pathogens from one patient or hospital surface to the other. Use of proper handwashing regimen can break this vicious cycle. Hand hygiene can also be a problem in busy health centers and clinics where there is a huge rush of patients and they are treated in rapid succession (Gould, 1997).

### Hand Hygiene by Patients

Handwashing is essential not only by health care providers but also by the patients involved. Hospitals are home to many dangerous pathogens. Patients touch contaminated surfaces and these pathogens thus are transmitted when patients eat or touch their mouth. Many studies have reiterated the benefits of including patients in hand hygiene promotion campaigns. A study measuring patient hand hygiene in multi-organ transplant units found that in over 12,000 bathroom visits, patients washed their hands only 30% of the time on an average. Average patient hygiene when entering and leaving their rooms was less than 5% and even lower for visits to patient kitchens (Srigley et al,2014).

### Hand Hygiene in Domestic Settings

The other side of the coin is hand hygiene for general public in order to prevent communicable diseases like influenza or common cold etc. along with prevention of diseases transmitted through fecal-oral route. Whilst the promotion of handwashing in domestic setting has always figured in public health efforts around the world for many years, handwashing rates remain very low. Studies show rates as dismal as 2-10% (Scott et al,2003).

It is to be noted that while contaminated hands pose a risk to all the family members, however, they are not at equal risk of death from diseases like diarrhea. Children less than five years and especially infants less than one year are the most open to danger. Studies report that 43% to 78% of deaths from diarrhea among children younger than five years occurred in first year of life (Yassin, 2000; Fikree et al, 2002; Baqui et al, 2001; Shamebo et al, 1991).

A randomized controlled trial on intensive handwashing promotion on childhood diarrhea in high risk communities in Pakistan tried to evaluate the effect of promoting household handwashing with soap among children. Results showed that in comparison to controls, children younger than 15 years living in households that received handwashing promotion and plain soap had a 53% lower incidence of diarrhea. Moreover, infants living in similar households had 39% fewer days with diarrhea. Not only this, severely malnourished children had 42% fewer days with diarrhea. Thus, in a setting where diarrhea is a leading cause of child death, improvement in handwashing in households reduced the incidence of diarrhea among children at high risk of death from diarrhea (Luby, 2004).

**Hand Hygiene in Children**

Studies have established that children have been recognized as important vectors for infections illness in the community (Gotz et al, 2001). Thus, handwashing among this age group may have particularly important public health implications along with improved health of children worldwide (Bowen, 2007). Moreover, school aged children can be accessed easily. A large number of students can be addressed in one go. Such children do not spread germs to others. Such children do not miss school. They have access to more exposure in school and perform well academically along with decreased absenteeism (Breuner, 2004; Wang, 2005).

A cluster-randomized control trial evaluating the effect of handwashing promotion program in Chinese primary schools found that in control schools, children experienced a median 2.0 episodes (median 2.6 days) of absence per 100 students - weeks. However, in standard intervention schools, there were a median 1.2 episodes (median 1.9 days) while in expanded intervention schools, there were a median 1.2 episodes and 1.2 days absence per 100 student-weeks (Bowen et al, 2007). Studies have repeatedly shown that intensive hand hygiene campaign is effective in reducing absenteeism in schools caused by illness (Bowen, 2007; Talaat, 2011).

**Hand Hygiene in Indian Schools**

Ensuring hand hygiene in Indian schools is a major challenge. Hygiene and especially handwashing with soap in all schools before the mid day meal remains a challenge. Group handwashing facilities and soap, systematic behavior change initiatives are required, to sustain changes in practices and behaviors amongst students. Findings of an assessment conducted in 540 schools in nine states in India on Mid Day Meal (MDM) programme reveal that:

- Only (51%) of the schools have a designated handwashing space and in 44 per cent of the schools observed, the handwashing space was being used.
- Only close to one in ten (12%) of schools had soap/detergent available at the handwashing space.
- Nearly half (49%) of the students washed their hands using only water. Only two out of five (42%) students use soap/detergent (UNICEF, 2009).
- According to PAHELI Survey under GOI-UN Joint Programme on Convergence, Survey conducted in 392 schools in seven states in India reveal that nearly one third (32%) of the children wash hands with soap before eating.

## THE TECHNIQUE OF HANDWASHING

The Centre for Disease Control and Prevention (CDC, USA) has provided detailed public information as to when and how to wash one's hands.

**Handwashing at Critical Times**

- Before, during, and after preparing food.
- Before eating food.
- Before and after caring for someone who is sick.
- Before and after treating a cut or wound.
- After using the toilet.
- After changing diapers or cleaning up a child who has used the toilet.
- After blowing your nose, coughing or sneezing.
- After touching an animal, animal feed or animal waste.
- After handling pet food or pet treats.
- After touching garbage.

**The Technique of Handwashing**

- **Wet** your hands with clean, running water (warm or cold) turn off the tap, and apply soap.
- **Lather** your hands by rubbing them together with the soap. Be sure to lather the back of your hands, between your fingers, and under your nails.
- **Scrub** your hands for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song from beginning to end twice.
- **Rinse** your hands well under clean, running water.
- **Dry** your hands using a clean towel or air dry them.

**Common Mistakes During Handwashing**

In this context, The Asthma Society of Canada has outlined some common mistakes that people generally make while washing hands.

- Washing hands in less than 10 seconds.
- Washing with water only.
- Washing hands under running water (remove your hands from under the stream of water while lathering and washing).

- Ignoring backs of the hands, areas between the fingers and fingernail beds.
- Not washing before preparing food.
- Using a single damp cloth to wash more than one child's face and/or hands.
- Using a sink full of standing water to rinse hands.
- Using a common hand towel.

## MAKING HAND HYGIENE PROMOTION MORE EFFECTIVE

Handwashing may require infrastructural, cultural and behavioral changes, which take time to develop, as well as substantial resources e.g. trained personnel, community organization, provision of water supply and soap. (Cave and Curtis, 1999; Yeager et al, 1999; Luby, 2001). Thus, the foremost responsibility of the state lies in finding resources to meet the basic demands for hand hygiene.

However, hand hygiene is more than just the availability of facilities required for the same. Low rates of handwashing are rarely caused by a lack of soap. Soap is present in vast majority of households worldwide but is commonly used for bathing and laundry, not for handwashing. Moreover, lack of water is usually not a problem either. The vast majority of even poor households have soap in their home. According to The Global Public-Private Partnership for Handwashing, research in peri-urban and rural areas found that soap was present in 95% of households in Uganda, 97% households in Kenya and 100% of households in Peru. In studies around the world one main reason for low rates of handwashing with soap is that this is simply not a habit. Thus, the aim should be to bring a change in private, personal behaviors and habits. Instead of imposing top-down targets and technology led campaigns, other approaches might be more successful where needs, preferences and incentives interplay to lead to a positive change.

Moreover, simple repetitions of the benefits of hand hygiene might not be the way to inculcate hand hygiene as a habit in the masses and in medical professionals. Ironically, human beings around the world fail to do things they should do. If they did, everyone would be very careful about other habits like eating junk food, drinking to excess or smoking, being overweight and not exercising. The very fact is that though we know what is right, we seldom follow it to the core (Frederiksen et al., 1984) in their book on marketing health behavior talk about the frustrating efforts of making people comply with various preventive or rehabilitative behaviors in order to improve health. He has made an effort to formulate an approach to improve adherence with the help of the idea of social marketing. Similarly, medical personnel fully understand the health benefits of handwashing with soap but might not follow the required regimen because of lack of time, overworked schedules, dryness due to washing or inconveniently placed sinks and other reasons.

Thus, we have to be vigilant and insightful about making this message a practical reality. Donovan (2010), has outlaid in detail the theory and principals of social marketing combining the latest research with real life examples of social marketing campaigns in the world. It is an insight into use of methods of marketing to a broad range of social issues and gives insight into using social marketing in public health context. A look at social behavior and advertising scenario shows that what affects behavioral change is not so much about the awareness of health but social marketing-appealing to people desires for status, acceptance, privacy, convenience, safety, comfort and so on instead of plain sanitation programmes to generate community demand for toilets etc. In short, best results come from treating people as active customers motivated

by a diverse range of preferences and motivations rather than passive project beneficiaries.

Thus, it is essential to analyze the kind of group that the message for hand hygiene is meant for. A large burden of communicable diseases comes from medical settings. A handwashing campaign begun in 2005 in New York City Public Hospitals has been very successful in reducing infectious illnesses contracted by hospital patients. According to Doug McKenzie (2011), there is a growing understanding that programmes that rely heavily or exclusively on media advertising can be effective in creating public awareness and understanding of issues relating to sustainability but are limited in their ability to foster behavior change. Instead community based social marketing can be applied successfully to foster sustainable behavior. Most of public health campaigns target mothers and other caregivers of children under five. Programs such as the Public-Private partnerships for handwashing with soap (http://www.globalhandwashing.org), the Hygiene Improvement Project (http://www.HIP.watsan.net) and work by UNICEF, WASH and others seek to substantially increase rates of handwashing with soap among child caretakers, children and their families in poor settings around the world.

It is also beneficial to make schools as agents of change. School programmes help in bringing, maintaining and improving change. Children are more prone to being influenced and are more receptive. Studies show that children are apt to integrate new health behaviors into their daily routines (Uhari and Mottonen, 1999). They become important agents of change and motivate classmates to alter their behavior (Rohde and Sadjimin, 1980) and also influence increased handwashing among parents and siblings. Children are important decision makers relating to health care purchases for households (Brewis and Gartin, 2006). Healthy children are less likely to expose family members and other close contacts to infectious agents. Teachers in schools and child care centers where handwashing promotion has occurred may also experience fewer illnesses (Uhari and Mottonen, 1999). In context of India, launching of Swacch Bharat, Swacch Vidyala Schemes thus have a huge potential in tapping the young minds and make personal hygiene especially hand hygiene.

There is also a need to analyze how to make hand hygiene practices a matter of routine habit supported by social norms on a large scale. A study on effect of intensive handwashing promotion in Pakistan found that although handwashing, typically with water alone is a part of ritual preparation for prayer in these communities, thorough washing with soap is less common even though affordable soap was available (Luby et al 2004). Such ritualistic handwashing is common in countries like India also. This potential for hand hygiene can be tapped by involving various religious leaders, NGOs and media along with community groups, schools and other private sector enthusiasts in the promotion of hand hygiene at a mass scale.

Global handwashing day is another step in inculcating handwashing as a daily habit. Each year, 200 million people are involved in celebrations in over 100 countries around the world.

A growing understanding of what drives hygiene behavior and creative partnerships are providing fresh approaches to change behavior. Full and active involvement of health sector in getting safe hygiene to all homes, schools and institutions will bring major gains to public health (Curtis et al, 2011). Research shows that handwashing behavior tends to stick once individuals have adopted the practice (Uhari, 1999; Greenberg et al, 2003). Thus, joint efforts at personal, community and state level can help us meet the challenge of making handwashing with soap a worldwide habit and social norm.

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